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EXAMINER	
THAKUR, VIREN A	

ART UNIT	PAPER NUMBER
1782	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,448	WAKAMURA, MASATO	
	Examiner	Art Unit	
	VIREN THAKUR	1782	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 January 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15,17-19 and 26-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15,17-19 and 26-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. As a result of the amendment to the claims, the rejection of claims 15, 17-19, 23-32 under 35 U.S.C. 112, second paragraph has been withdrawn.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 15, 17, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunn (US 5658530) in view of Wakamura (JP2000-327315), Saito (JP03-275627) and Mawatari et al. (US 5614568).

Regarding claim 15, Dunn teaches a method for deactivating biological contaminants and chemical contaminants on the surface of a perishable food product or on the packaging material by passing light through the package (Column 2, Lines 49-61; Column 3, Lines 34-41). The surface of the packaging material or food product is supplemented with titanium dioxide, which when illuminated at specific light frequencies will deactivate contaminants within the package or on the surface of the food product (Column 3, Lines 14-23; Column 4, Lines 59-62). Thus, Dunn teaches applying the anti-microbial composition to the food itself or to the packaging containing the food. Dunn further teaches the inner surface of the container comprises the titanium dioxide (Column 11, Line 58 to Column 12, Line 30). Dunn teaches applying a photocatalytic material to food containers or directly to foods.

Regarding claim 15, Dunn is silent in teaching the use of Ti modified calcium hydroxyapatite and bringing food into contact with the Ti-modified calcium hydroxyapatite.

Wakamura et al. '315 teaches that titanium oxide has been well known be an antimicrobial agent (Paragraph 0002). Wakamura et al. '315 further teach that titanium oxide does not have the properties for adsorbing matter, such as microorganisms on its face, and limited oxidative degradation of such microorganisms is achieved using titanium oxide, alone (Paragraph 0002). Wakamura et al. '315 teach that titanium oxide films have limited oxidative degradation function when used on its own and calcium phosphate compounds such as hydroxyapatite tends to lose its adsorption power when adsorption equilibrium is reached (Paragraph 0006). Wakamura et al.'315 further

teaches replacing part of Ca with Ti (Paragraph 0010). The invention of Wakamura et al. ‘315 teach a combination of the photocatalyst activity of titanium with the adsorption activity of hydroxyapatite that maintains the adsorption power of the calcium phosphate while maintaining the oxidative disassembling properties of the photocatalyst (Paragraph 0002; Paragraph 0006; Paragraph 0007). Wakamura et al. ‘315 further teach that the metal modified hydroxyapatite can be applied to several “configurations” such as a sheet, a film, a plate, a particle and a tablet (Paragraph 0017). Wakamura et al. ‘315 teach that the sheet or film can be used to cover one or both sides of a base material (Paragraph 0017). Since Wakamura ‘315 teaches the advantage of the using Ti-modified calcium hydroxyapatite over only using titanium, to substitute the antimicrobial agent used in Dunn with the titanium modified calcium hydroxyapatite taught by Wakamura et al. ‘315 would have been obvious to one having ordinary skill in the art for the purpose of improving obtaining both the photocatalytic activity of the titanium with the adsorption activity the calcium hydroxyapatite. Therefore, it would have been obvious to one having ordinary skill in the art to modify Dunn and employ a titanium modified calcium hydroxyapatite, since the art teaches that such a combination solves the problem of providing satisfactory antibacterial and photocatalytic activity to containers.

Claim 15 differs from the above combination in reciting that the titanium modified calcium hydroxyapatite has been sintered at 580-660°C for enhancing photocatalytic activity.

It is noted however, that Saito teaches replacing the metal ion on hydroxyapatite with an antimicrobial metal and then employing an ion-exchange method to produce a metal modified hydroxyapatite (see page 4 of the formal translation). After filtering and then drying at 110°C for 4 hours, Saito teaches heating the combination at 600°C (see page 5, lines 11-16 of the formal translation and example 2). The resulting product has potent antimicrobial activity, is resistant to heat and chemicals and retains its antimicrobial activity when mixed with resins (see page 2 "Problems to be solved by the invention"). The heating at 600°C falls within applicants' claimed range, and further results in rigidly fixing the metal ions with the hydroxyapatite so as to prevent the metal ions from readily dissolving out (see page 5, lines 11-16 of the translation). On page 4 of the formal translation, Saito also teaches that various antimicrobial metals can be employed, such as silver, copper, zinc, tin, mercury, lead, cadmium to name a few. It is noted that Wakamura '315 teaches using various antimicrobial metals, such as titanium, zirconium or zinc (paragraph 0005) as well as iron tungsten and other oxides of a metal (see paragraph 0015) and copper and aluminum (see paragraph 0012). Therefore, an overlap exists between the particular metals employed by Saito and Wakamura '315, such as copper and zinc. It is even noted that zirconium, taught by Wakamura '315 is in the same group as titanium on the periodic table. Furthermore, all of titanium, zinc, copper are transition metals within the same period and have been recognized to have antibacterial properties, and zinc, for instance has been known in the art to also have photocatalytic activity.

Therefore the metals taught by Wakamura ‘315 and Saito, who teaches heating at 600°C, are similar in that they are all antimicrobial acting metals.

Additionally, Saito and the above combination are similar in that they employ metal modified hydroxyapatite for the purpose of providing antimicrobial properties when applied to articles. The art has also recognized the advantage of heating to within applicants' claimed range, for the purpose of preventing the metal from dissolving out and for providing antimicrobial and photocatalytic activity, as taught by Saito. To thus modify the combination of Dunn and Wakamura ‘315 and heat the titanium modified calcium hydroxyapatite to 600°C as taught by Saito would have been obvious to one having ordinary skill in the art, since Saito teaches that heating of a metal modified calcium hydroxyapatite results in improved fixing of the metal onto the hydroxyapatite thus preventing the metal from dissolving out.

Although Dunn already teaches applying an antibacterial agent to food containers and bringing into contact with food, Mawatari et al. has been cited as further evidence that it has been conventional in the art to employ a metal modified calcium hydroxyapatite (column 5, lines 3-6 and column 7, lines 22-49) to articles that come into contact with food, such as kitchenware (column 1, line 17), for its antibacterial properties. Mawatari et al. further teach that by supporting the metal ions on the porous substance, the porous structured substance have been subjected to ion-exchange with the metal ions (Column 4, Line 62 to Column 5, Line 2). As a result, the metal supported on the substrate would not be dissolved out by water treatment (Column 7, Lines 43-47) and thus can be applied to the molded article such as the polymeric resin

at any amount (Column 7, Lines 47-49). Mawatari et al. also teaches that the metal modified hydroxyapatite can be employed in food contact applications such as kitchenware. Saito also teaches a metal modified hydroxyapatite that can be used for kitchen articles (i.e. articles that would have come into contact with food). Therefore, one of ordinary skill in the art would have been reasonably led to have employed the metal modified calcium hydroxyapatite of Wakamura ‘315 for containers used for protecting food against spoilage.

Claim 15 further recites that the food is brought into contact with the titanium modified hydroxyapatite by placing food in a container that has been coated with the sintered titanium modified apatite.

Regarding this limitation, it is noted that Dunn already teaches putting food into a container that is coated with an antibacterial agent. Nevertheless, it would have been obvious to have substituted the titanium taught by Dunn for the titanium modified calcium hydroxyapatite, as taught by Wakamura ‘315 for the purpose of achieving the combined photocatalytic effects of the titanium with the absorption properties of the apatite. It is noted that Mawatari et al. already teach metal modified apatite employed for their antimicrobial functions, and which have been coated on containers such as for kitchenware, as discussed above. This reasonably teaches that metal modified hydroxyapatite can be employed in food contact applications.

Claim 17 is similar to claim 15 except that instead of a container, the food is wrapped in a wrapping film coated with the metal modified calcium hydroxyapatite. Wakamura et al. ‘315 also teach wherein the substrate can be a sheet or film

(paragraph 0017, 0019 and 0020). Since the art taught coating various food contact surfaces with a metal modified apatite, it would have been obvious to one having ordinary skill in the art to apply the titanium modified hydroxyapatite, as taught by the combination, to packaging films, for the purpose of preventing contamination of the foodstuffs that can be wrapped in the film.

Claims 29 and 30 recite the limitation that “the storage of the food is performed without light irradiation.” It is noted that light would not appear to be present when storing foods within a refrigerator or in a pantry. Nevertheless, it is noted that Dunn even teaches that *if* in light, then titanium metals can facilitate prevention of contamination by employing photocatalytic activity of the titanium. Nevertheless, since the combination already teaches using a combination of photocatalytic material and antimicrobial material, to thus store a food package having a coating of this material in a place without light irradiation, such as a refrigerator would still have been obvious to one having ordinary skill in the art for the purpose of preventing contamination due to exposure to light.

5. Claims 18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29, 30, above, relying on Dunn as the primary reference, and in further view of Sakuma et al. (US 5468489).

Claim 18 differs from the combination as applied above in reciting applying the calcium hydroxyapatite to the surface of the food or adding the sintered titanium modified calcium hydroxyapatite to the food. It is noted that, Dunn teaches that the

antibacterial agent can be applied to the food or to the food packaging. It is further noted that Sakuma et al. also teach sintered metal modified calcium hydroxyapatite which has been included into toothpaste (see abstract). Furthermore, Wakamura ‘315 also teaches that the titanium modified calcium hydroxyapatite can be in a particulate form (paragraph 0017) and Saito teaches metal modified hydroxyapatites applied to food related applications (such as kitchen articles). The art thus teaches that titanium and metal modified hydroxyapatite can be used in products that can be ingested. Therefore the art taken as a whole teaches that it was conventional in the art to include metal modified calcium hydroxyapatite and metal modified calcium hydroxyapatites to food and to thus add sintered titanium modified calcium hydroxyapatite to food would have been obvious to one having ordinary skill in the art for the purpose of preventing the growth of bacteria on the food or in the food.

Claim 31 is similarly rejected for the reasons given above with respect to claims 29 and 30 in the rejection relying on Dunn as the primary reference.

6. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29 and 30 above, and in further view of Taoda et al. (US 5981425) and Izawa (JP2000-17456).

Regarding claims 26 and 27, the combination as applied above teaches coating a container with a metal modified hydroxyapatite, as evidenced by Mawatari for instance.

Claims 26 and 27 differ in reciting that the packaging material has been coated with a sol-gel solution containing a silica alkoxide and a powder of the metal modified hydroxyapatite.

It is noted however, that the use of silica alkoxide sol-gel solutions for coating surfaces has been a conventional technique for applying coatings. For instance Taoda et al. teaches a coating composition comprising photocatalytic activity, which includes a titanium oxide and a calcium phosphate (column 2, lines 42-43 and column 1, lines 5-10 and line 65 to column 2, line 4), and wherein the calcium phosphate can be a hydroxyapatite (column 4, lines 55 to column 5, line 7) and further teaches employing a metal alkoxide sol-gel, such a silica alkoxide sol-gel (column 7, lines 8-15) for preparing an inorganic coating (column 8, lines 11-15 and column 8, lines 36-57). Taoda et al. is similar to the combination applied above in that it teaches employing a combination of titanium photocatalytic materials with hydroxyapatite antimicrobial materials and coating the combination on a substrate for achieving both antimicrobial and photocatalytic protection. It is noted that Taoda et al. even teaches that calcination of a titanium coated substrate at 600℃ increases the photocatalyst activity of the titanium (see column 3, lines 56-67). Izawa teaches a similar process of employing a silica alkoxide sol-gel for the purpose of coating a metal and apatite combination (see abstract), for the purpose of providing an antimicrobial coating on the surface of articles such as tableware (see paragraph 0006, 0007, 0009 and 0015 of the machine translation). Izawa teaches that such a coating provides antimicrobial protection (paragraph 0011) and also results in a coating for tableware or containers that has excellent flexibility

(paragraph 0030 of the machine translation). It is noted that Wakamura '315 already teaches applying the titanium modified hydroxyapatite as a coating. Therefore, to modify the combination and employ a silica alkoxide sol-gel process for coating a titanium modified hydroxyapatite powder to the surface of a container would have been obvious to the ordinarily skilled artisan as a conventional expedient for coating container and food contact surfaces, which provides protection against microorganisms as well as photo-degradation and which has excellent flexibility and durability.

7. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 15, 17, 29 and 30, above and in further view of Farnham (US 2531329), Salvi (US 6632467) or GoogleGroups or "Storing Food"

Regarding claims 29 and 30, it would have been obvious to have stored products without exposure to light radiation, as discussed above. Nevertheless, Farnham further teaches that storage in darkness minimizes the effect of light (see column 4, lines 54-60) (in this case, UV light). Salvi further evidences this concept on column 16, lines 53-59). Also, GoogleGroups and "Storing Food" teach that it has been advantageous to store foods in the dark (i.e. no light irradiation) for the purpose of preventing spoilage. Therefore, to modify the combination and store the food without exposure to light would thus have been obvious to one having ordinary skill in the art, for the purpose of preventing light irradiation from resulting in contamination or spoilage of the product.

8. Claims 19 and 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29 and 30, above in paragraph 5, and in further view of Okamoto (JP 2000-051041).

Claim 19 recites bringing the food into contact with tableware surface coated with sintered titanium modified calcium hydroxyapatite. It is not clear as to whether the kitchenware taught by Mawatari can be considered tableware. Nevertheless, Okamoto teaches tableware, such as a drinking cup that comprises a photocatalyst for the purpose of removing odor and dirt from the inner portions of the tableware. Thus, Okamoto teaches providing similar photocatalytic activity to the surfaces of tableware for the purpose of preventing dirt and odors that collect on the inner surface from affecting the taste of the food. In addition, Mawatari et al. teaches coating kitchenware with metal modified calcium hydroxyapatite for the similar purpose of preventing bacterial growth.

In view of the art taken as a whole, to therefore place food onto tableware or kitchenware that has also been coated with sintered titanium modified calcium hydroxyapatite would thus have been an obvious matter of choice and/or design, especially since the combination already teaches placing food into a container or wrapping food comprising sintered titanium modified calcium hydroxyapatite. As discussed above, once it was known in the art to coat kitchenware, containers and other

articles with sintered titanium modified calcium hydroxyapatite, the particular article coated would have been an obvious matter of choice and/or design.

Claim 32 is similarly rejected for the reasons given above with respect to claims 29 and 30 in the rejection relying on Dunn as the primary reference.

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 19 above, and in further view of Taoda et al. (US 5981425) and Izawa (JP2000-17456). Claim 28 repeats those limitations recited in claims 26 and 27 and thus is rejected for the reasons given above with respect to claims 26 and 27.

10. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 18 and 31 above in paragraph 5, and in further view of Farnham (US 2531329) Salvi (US 6632467) or GoogleGroups or "Storing Food", for the reasons given above with respect to claims 29 and 30, above in paragraph 7.

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 19 and 32 above in paragraph 8, and in further view of Farnham (US 2531329), Salvi (US 6632467), Salvi (US 6632467) or

GoogleGroups or "Storing Food", for the reasons given above with respect to claims 29 and 30, above in paragraph 7.

12. Claims 15, 17, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakamura (JP 2000327315) in view of Saito (JP03275627) and in further view of Dunn (US5658530) and Mawatari et al. (US 5614568).

Regarding claim 15, Wakamura '315 teaches titanium modified calcium hydroxyapatite, which provides both the antimicrobial (photocatalytic) effects of the titanium in combination the adsorbing properties of calcium hydroxyapatite. Wakamura '315 teaches that this combination is improved over titanium alone which has limited photocatalytic (oxidation) functionality, by modifying calcium hydroxyapatite with a metal such as titanium. Wakamura '315 teaches a combination can absorb organic substances and also employ the antimicrobial / photocatalytic activity of the metal.

The claim differs from Wakamura '315 in specifically reciting sintering the titanium modified calcium hydroxyapatite at between 580℃ to 660℃.

Saito has been relied on as discussed above, to teach the advantages of heating a metal modified hydroxyapatite to 600℃ , for the purpose of preventing dissolution of the metal after drying. The art taken as a whole fairly teaches sintering a metal modified calcium hydroxyapatite for the purpose of improving its catalytic and/or antimicrobial activity and for preventing dissolution of the metal from the metal modified hydroxyapatite. Thus to employ temperatures of 600℃, for instance, would have been

obvious to one having ordinary skill in the art for preventing the metal from dissolving out of the metal-modified hydroxyapatite.

The claim further differs from the combination in bring food into contact with the sintered titanium modified calcium hydroxyapatite. It is noted that Dunn already teaches a container coated with an antimicrobial agent, such as titanium, into which food is placed (i.e. bringing food into contact with the antimicrobial agent), as discussed in the first rejection of claim 15, above. Also, Saito teaches metal modified hydroxyapatite that can be used for kitchen articles, which one of ordinary skill would have recognized would relate to food contact articles. Since Wakamura '315 teaches improved properties of the titanium modified calcium hydroxyapatite, compared to the photocatalytic/antimicrobial titanium alone, to coat a container for preserving food with the sintered titanium modified calcium hydroxyapatite as taught by the combination, would have been obvious to one having ordinary skill in the art, for the purpose of improving the antimicrobial activity of the coating used to preserve the food. It is noted that Mawatari et al., has been relied on as discussed above to teach that it was conventional to combine a metal such as silver with calcium hydroxyapatite and coat containers and films into which food is placed, for the purpose of preserving the food.

Claim 17 is similar to claim 15 except that instead of a container, the food is wrapped in a wrapping film coated with the metal modified calcium hydroxyapatite. Wakamura et al. '315 also teach wherein the substrate can be a sheet or film (paragraph 0017, 0019 and 0020). Since the art taught coating various food contact surfaces with a metal modified apatite, it would have been obvious to one having

ordinary skill in the art to apply the titanium modified hydroxyapatite, as taught by the combination, to packaging films, for the purpose of preventing contamination of the foodstuffs that can be wrapped in the film.

Claims 29 and 30 recite the limitation that “the storage of the food is performed without light irradiation.” It is noted that light would not appear to be present when storing foods within a refrigerator or in a pantry. Nevertheless, it is noted that Dunn even teaches that *if* in light, then titanium metals can facilitate prevention of contamination by employing photocatalytic activity of the titanium. Nevertheless, since the combination already teaches using a combination of photocatalytic material and antimicrobial material, to thus store a food package having a coating of this material in a place without light irradiation, such as a refrigerator would still have been obvious to one having ordinary skill in the art for the purpose of preventing contamination due to exposure to light.

13. Claims 18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29, 30, above in paragraph 12, relying on Wakamura ‘315 as the primary reference, and in further view of Sakuma et al. (US 5468489).

Claim 18 differs from the combination as applied above in reciting applying the calcium hydroxyapatite to the surface of the food or adding the sintered titanium modified calcium hydroxyapatite to the food. It is noted that, Dunn teaches that the antibacterial agent can be applied to the food or to the food packaging. It is further

noted that Sakuma et al. also teach sintered metal modified calcium hydroxyapatite which has been included into toothpaste (see abstract). Therefore the art taken as a whole teaches that it was conventional in the art to include titanium modified calcium hydroxyapatite and metal modified calcium hydroxyapatites to food and to thus add sintered titanium modified calcium hydroxyapatite to food would have been obvious to one having ordinary skill in the art for the purpose of preventing the growth of bacteria on the food or in the food.

Claim 31 is similarly rejected for the reasons given above with respect to claim 31 in the rejection relying on Dunn as the primary reference.

14. Claims 19 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29, 30, above in paragraph 12, relying on Wakamura '315 as the primary reference, and in further view of Okamoto (JP 2000-051041).

Claim 19 recites bringing the food into contact with tableware surface coated with sintered titanium modified calcium hydroxyapatite. It is not clear as to whether the kitchenware taught by Mawatari can be considered tableware. Nevertheless, Okamoto teaches tableware, such as a drinking cup that comprises a photocatalyst for the purpose of removing odor and dirt from the inner portions of the tableware. Thus, Okamoto teaches providing similar photocatalytic activity to the surfaces of tableware for the purpose of preventing dirt and odors that collect on the inner surface from

affecting the taste of the food. In addition, Mawatari et al. teaches coating kitchenware with sintered metal modified calcium hydroxyapatite for the similar purpose of preventing bacterial growth.

In view of the art taken as a whole, to therefore place food onto tableware or kitchenware that has also been coated with sintered titanium modified calcium hydroxyapatite would thus have been an obvious matter of choice and/or design, especially since the combination already teaches placing food into a container or wrapping food comprising sintered titanium modified calcium hydroxyapatite. As discussed above, once it was known in the art to coat kitchenware, containers and other articles with sintered titanium modified calcium hydroxyapatite, the particular article coated would have been an obvious matter of choice and/or design.

Claim 32 is similarly rejected for the reasons given above with respect to claim 32 in the rejection relying on Dunn as the primary reference.

15. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 15, 17, 29 and 30 above in the reference relying on Wakamura ‘315 as the primary reference in paragraph 12, and in further view of Taoda et al. (US 5981425) and Izawa (JP2000-17456).

Regarding claims 26 and 27, the combination as applied above teaches coating a container with a metal modified hydroxyapatite, as evidenced by Mawatari for instance. Claims 26 and 27 differ in reciting that the packaging material has been

coated with a sol-gel solution containing a silica alkoxide and a powder of the metal modified hydroxyapatite.

Taoda et al. and Izawa have been relied on as discussed above in paragraph 6 relying on Dunn as the primary reference. Thus, to modify the combination and employ a silica alkoxide sol-gel process for coating a titanium modified hydroxyapatite powder to the surface of a container would have been obvious to the ordinarily skilled artisan as a conventional expedient for coating container and food contact surfaces, which provides protection against microorganisms as well as photo-degradation.

16. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 19 and 32 above in paragraph 14, and in further view of Taoda (US 5981425) and Izawa (JP2000-17456), for the reasons given above in paragraph 15 with respect to claims 26 and 27.

17. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 15, 17, 29 and 30 above in paragraph 12, relying on Wakamura ‘315 as the primary reference and in further view of Farnham (US 2531329), Salvi (US 6632467) or GoogleGroups or “Storing Food”

Regarding claims 29 and 30, it would have been obvious to have stored products without exposure to light radiation, as discussed above. Nevertheless, Farnham further teaches that storage in darkness minimizes the effect of light (see column 4, lines 54-60) (in this case, UV light). Salvi further evidences this concept on column 16, lines 53-59). Also, GoogleGroups and “Storing Food” teach that it has been advantageous to store foods in the dark (i.e. no light irradiation) for the purpose of preventing spoilage. Therefore, to modify the combination and store the food without exposure to light would thus have been obvious to one having ordinary skill in the art, for the purpose of preventing light irradiation from resulting in contamination or spoilage of the product.

18. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 18 and 31 above in paragraph 13, and in further view of Farnham (US 2531329), Salvi (US 6632467) or GoogleGroups or “Storing Food” for the reasons given above with respect to claims 29 and 30 above in paragraph 17.

19. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied above to claims 19 and 32 above in paragraph 14, and in further view of Farnham (US 2531329), Salvi (US 6632467) or GoogleGroups or

"Storing Food" for the reasons given above with respect to claims 29 and 30 above in paragraph 17.

Response to Arguments

20. Applicant's arguments filed January 27, 2011 have been fully considered but they are not persuasive.

21. On pages 6-7 of the response, applicants assert that Wakamura1 teaches away from the disclosure in Saito of heating to 600° since Wakamura states that the ion exchange method that has been employed does not use heat treatment at 500℃. Applicants thus assert that this disclosure teaches away from using heat treatment as taught by Saito.

This urging has been considered but is not persuasive. It is noted that Wakamura '315 thus teaches that the method for forming the titanium modified calcium hydroxyapatite does not require heat treatment at 500℃. It is noted however, that Saito also teaches forming the metal modified hydroxyapatite using a process that is similar to that of Wakamura '315 - an ion exchange operation that is similar to that of Wakamura '315, in that both references teach heating step and a subsequent drying step. (see example 1 and 2 of Saito and Example 1 of Wakamura '315). Nevertheless, <u>after</u> this ion exchange process, Saito teaches heating at 600℃ for the purpose of ensuring that the metal modified hydroxyapatite has potent antimicrobial activity, is resistant to heat

and chemicals and retains its antimicrobial activity when mixed with resins (see page 2 of Saito "Problems to be solved by the invention"). Wakamura '315 does not state that an additional processing step could not occur after the drying step. Since Wakamura '315 also teaches application of the metal modified hydroxyapatite as a coating or as a film onto articles, one of ordinary skill in the art would have been reasonably led to heat treat at 600°C for the purpose of ensuring that the metal modified hydroxyapatite has improved antimicrobial activity and is resistant to heat and chemicals and retains its antimicrobial activity when mixed with resins.

22. On page 8 of the response, applicants' assert that Mawatari fails to teach Ti-CaHAP and merely teaches calcium hydroxyapatite as an example of support for a metal catalyst such as silver. Applicants also assert that the sintering in Mawatari is performed only for strengthening the bonding of silver on the calcium hydroxyapatite support but not for enhancing photocatalytic activity.

It is noted however, that Mawatari also teaches that the porous material (i.e. the hydroxyapatite) is subjected to an ion-exchange with metal ions such as silver, copper, zinc (see column 4, line 62 to column 5, line 9 and column 6, line 63 and column 7, line 22-32). It is noted that both Wakamura '315 and Saito also teach employing ion exchange between a hydroxyapatite and a metal. Thus, there would have been a reasonable expectation that Mawatari also resulted in a metal modified hydroxyapatite. In any case however, Mawatari has only been relied on to teach that photocatalytic

metals and antimicrobial absorbents have been conventionally recognized in the art to be applied to packaging for food contact applications.

23. It is noted that Shimazaki (JP63-023744), Sakurada (US6004667), Sakurada et al. (JP11-343210), Wakamura (JP2001-302220), Kato (JP07-100378), Imura (WO0046153), Bontinck (US 4367312) have been withdrawn as being duplicative in nature.

24. Further on page 8 of the response, Applicants assert that Sakuma teaches that dentifrices that comprise calcium hydroxyapatite supporting or combining with an antibacterial metal but only employ examples which use Ag, Zn and Cu and thus Sakuma fails to teach or suggest Ti-CaHAP wherein calcium in calcium hydroxyapatite is substituted with titanium, let alone sintering of Ti-CaHAP at between 580-660℃ for enhancing photocatalytic activity of the Ti-modified hydroxyapatite.

This argument is not persuasive in view of the teachings of Wakamura '315, who teaches Ti-modified CaHAP and Saito, who teaches heating metal modified hydroxyapatites temperatures such as 600℃ for the purpose of improving their antimicrobial activity and for improving the heat and chemical resistance of the metal modified hydroxyapatite.

Furthermore, it is noted that Wakamura, Saito, Mawatari and Sakuma all teach reactive metals which provide antimicrobial properties and Saito and Wakamura '315 also teach reactive metals which overlap. Wakamura '315 teaches antibacterial metals

such as metal oxides of titanium, zirconium or zinc (paragraph0005) and Saito teaches that zinc and silver are metals that provide antibacterial properties. It is noted that Saito also teaches the use of metal sulfates (see top of page 5 of the formal translation), as does Wakamura '315 (see example 1, paragraph 0021). In view of these similarities between the Wakamura '315 and Saito, who both teach metal modified hydroxyapatites using overlapping types of metals (such as zinc), which provide antibacterial properties, one of ordinary skill in the art would have been reasonably led to experiment with and heat the titanium modified calcium hydroxyapatite taught by Wakamura '315 to 600°C, for instance, for the purpose of improving its heat and chemical resistance.

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP09-226060 discloses titanium oxide and zinc oxide as photocatalytic materials. WO0006300 discloses titanium and zinc oxides as photocatalytic.

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VIREN THAKUR whose telephone number is (571)272-6694. The examiner can normally be reached on Monday through Friday from 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on (571)-272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/V. T./
Examiner, Art Unit 1782

/Rena L. Dye/
Supervisory Patent Examiner, Art Unit 1782